

APR 6 1966 ~~APR 6 1966~~
USS-10

National Aeronautics and Space Administration
Goddard Space Flight Center
Contract No. NAS-5-9299

Note: I prefer to see
Soviet Astronomy

Therefore do not bother sending
me any ~~of~~ separate
translations from
Astronomicheskii Zhurnal
M. Roman

ST - RA - LPS - 10469

OBSERVATIONS OF RADIO EMISSION FROM PLANET MARS
IN THE 8 mm WAVELENGTH

by

B. G. Kutuza
B. Ya. Losovskiy
A. E. Salomonovich

(USSR)

602 FORM FACILITY

N66-83016	(THRU)
(ACCESSION NUMBER)	<i>none</i>
4	(CODE)
(PAGES)	
CR 74160	(CATEGORY)
(NASA CR OR TMX OR AD NUMBER)	

4 APRIL 1966

OBSERVATIONS OF RADIO EMISSION FROM PLANET MARS
IN THE 8 mm WAVELENGTH *

Astronomicheskiy Zhurnal
Tom 43, vyp. 1, 236-7,
Izdatel'stvo "NAUKA", 1966

by B.G. Kutuza
B.Ya. Losovskiy
A.E. Salomonovich

SUMMARY

The results of observations are presented of Mars' radio emission at 8 mm. These observations were conducted with the aid of the PT-22 radio-telescope of the Institute of Physics of the USSR Academy of Sciences in March 1965.

It is found that the brightness temperature of Mars, averaged over the disk, is $225 \pm 10^\circ \text{K}$.

. . .

As is well known [1, 2], the average temperature of the illuminated side of Mars constitutes according of measurement data in the transparency window of the terrestrial atmosphere $8 - 14 \text{ mk} \sim 2500^\circ \text{K}$. On the other hand, the more precise measurements by Mayer et al [3, 4] in 3.14 cm established the brightness temperature of planet's illuminated disk to be $211 \pm 20^\circ \text{K}$. Apparently, a constant temperature, independent from the change of portions of the day, is already established at the depth from which the 3 cm radiation originates (according to Kuiper data [5], the average emission temperature of the planet is $\sim 217^\circ \text{K}$).

Measurement of brightness temperature of planet's radio emission in shorter, that is, microwaves, offers interest; the layers, responsible for the microwave emission, situated nearer the surface, must, generally speaking, be periodically heated by the Sun and this is why the illuminated part of the planet must have a higher brightness temperature than in the centimeter band.

* NABLYUDENIYA RADIOIZLUCHENIYA MARSA NA VOLNE 8 mm.

Such measurements were conducted by us with the aid of the PT-22 radiotelescope of the Institute of Physics of the USSR Academy of Sciences in 8 mm during the opposition of March 1965. We used Jupiter as a reference source, its brightness temperature being taken, according to [6], equal to 144°K . The method of measurements did not differ from that earlier described [7].-

Altogether 57 registrations of Mars' passage on 8 and 15 March 1965 were performed. The results of averaging of the readings are plotted in Fig.1, while the results of these measurements' processing are compiled in the Table 1.

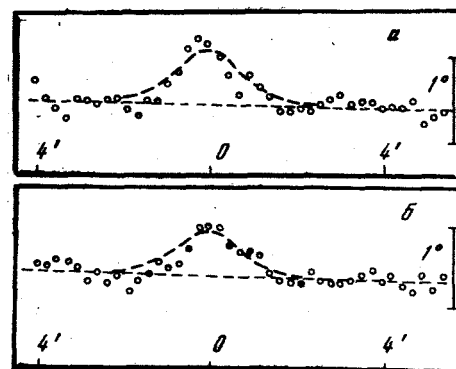


Fig.1. - Radio emission of Mars in 8 mm. -
a - 8 March 1965;
b - 15 March 1965.

TABLE 1

DATE OF OBSERVATIONS	NUMBER OF PASSAGES	$T_a (^{\circ}\text{K})$	Radius of planet's	$T_{\text{bright}} (^{\circ}\text{K})$
8 March 1965	31	0.64 ± 0.05	6.98	229 ± 30
15 " "	26	0.52 ± 0.03	6.99	224 ± 13

The average, balanced over the two days of observations, value of Mars' brightness temperature constitutes therefore $T_{\text{bright}} = 225 \pm 10^{\circ}\text{K}$.

The authors are grateful to I.F. Il'yin, A.N. Kozlov, L.S. Shevchenko and N.D. Matskova for their help during observations and the analysis of the results.

**** THE END ****

Institute of Physics in the name of
Lebedev of the USSR Ac. of Sciences
and

Received on 27 July
1965

Institute of Radioengineering and Electronics
of the USSR Academy of Sciences.

Contract No. NAS-5-9299
Consultants a. Designers, Inc.
Arlington, Virginia

Translated by ANDRE L. BRICHANT
on 4 April 1966

REFERENCES

- [1].- E. PETIT, S. B. NICHOLSON.- Publ. Astronom. Soc. Pasifs, 124, 269, 1924.
 [2].- D. H. MENZEL, W. W. COBLENTZ, C. O. LAMPLAND.- Astrophys. J. 63, 127, 1926.
 [3].- C. H. MAYER, T. P. McCULLOUGH, R. H. SLOANAKER. Proc. IRE, 64, 332, 1959.
 [4].- J. A. GIORDMAINE, L. E. ALSOP, C. H. TOWNES, C. H. MAYER.- Astronom. J., 64, 332, 1959.
 [5].- PLANETY I SPUTNIKI (Planets a. Satellites).- Sympo. under G. KUIPER, IL
 [6].- D. D. THORNTON, W. J. WELCH.- Icarus, 2, 228, 1963.
 [7].- B. G. KUTUZA, B. Ya. LOSOVSKIY, A. E. SALOMONOVICH.- Dokl. AN SSSR, 161, 58, [ST-RA-LPS-10 348] 1965.

DISTRIBUTIONGODDARD SPACE F.C.

100 CLARK, TOWNSEND
 110 STROUD
 400 BOURDEAU
 610 MEREDITH
 611 McDONALD
 ABRAHAM, BOLDT
 VKB, WILLIAMS
 SERLEMITSOS
 612 HEPPNER
 NESS
 613 KUPPERIAN
 DUNKELMAN
 BOGGESS III
 CHIN
 DONN
 614 WHITE
 HALLAM
 615 BAUER
 GOLDBERG
 MAIER
 STONE
 640 HESS
 O'KEEFE
 CAMERON
 BURLEY
 630 GI for SS [3]
 252 LIBRARY
 256 FREAS

NASA HQS

SS NEWELL, NAUGLE
 SG MITCHELL
 DUBIN
 ROMAN
 SMITH
 SCHARDT
 SL LIDDEL
 BRYSON
 BRUNK
 MOLLOY
 FELLOWS
 HOROWITZ
 SM FOSTER
 GILL
 RR KURZWEG
 RTR NEILL
 ATSS - T
 WX SWEET

OTHER CENTERS

AMES R C
 SONETT
 LIBRARY
LANGLEY R C
 160 ADAMSON
 235 SEATON
 185 WEATHERWAX
JPL
 NEWBURN
 KAPLAN
 WYCKOFF
U. MICHIGAN
 HADDOCK
MIT
 BARRETT
U C BERKELEY
 FIELD
SWCAS
 JOHNSON